

Remarks/Arguments:

The present invention relates to a radio communication apparatus that transmits information over a plurality of antennas. Specifically, the system selects transmission vectors to control receiving power and phase of a received signal.

On page 2, the Official Action objects to Figs. 3-5, 7, 9-11, 13, 16, 17, 21 and 22 because they are not properly labeled. Applicants have properly labeled the figures. Withdrawal of the objection is respectfully requested.

On page 3, the Official Action rejects claims 1-12 under 35 U.S.C. §112 as being indefinite. Specifically, the Official Action states that the preamble of the claims recite a transmitting apparatus, however, the body of the claims are directed towards a receiver. For example, claim 1 preamble recites "*transmitting apparatus comprising;*" but the body recites "*pieces of antenna elements for receiving a carrier modulation signal.*" Applicants have amended claim 1 to recite that the antenna array is used for both receiving **and for transmitting**. Therefore, the transmitting apparatus as recited in preamble is supported by the recitation of transmitting in the body. Withdrawal of the rejection is respectfully requested.

On page 5, the Official Action rejects claims 1, 2 and 4-6 under 35 U.S.C. §103(a) as being unpatentable over Hudson (U.S. 2002/0176485) in view of Guey (U.S. Patent No. 6,876,645). It is respectfully submitted, however, that the claims are patentable over the art of record for the reasons set forth below.

Hudson teaches a communication system where data bursts provide an extended training sequence. Specifically, the transmitted bursts are used for channel estimation. Guey teaches a multi-carrier CDMA system which receives a known pilot symbol. Specifically, the pilot symbol is used for channel estimation.

Applicants' invention, as recited by claim 1, includes a feature which is neither disclosed nor suggested by the art of record, namely:

a transmitting signal calculation means for calculating plural sets of transmitting symbol vectors ... generating a reference table configured by the plural sets of transmitting symbol vectors, the plural sets of transmitting symbols vectors being for controlling anyone of the

**receiving power and phase of the radio station ...
generating transmitting symbols by selecting one set of
the transmitting symbol vector from the reference table.**

Claim 1 relates to the generation of a plurality of transmitting symbol vectors and the selection of one of these vectors. The selection of one of the vectors from the plurality of transmitting symbol vectors is based upon controlling the receiving power and phase of the received symbol. This feature is found in the originally filed application on page 31 lines 1-10, page 33 lines 17-27 and furthermore in Figs. 18A, 18B and 19. No new matter has been added.

The art of record, in particular, Hudson, Guey, Doberstein, Bruekers and Subramanian do not teach an antenna array for transmitting and receiving. Thus, these references do not teach generating and selecting a plurality of transmission symbol vectors to control power and phase of the received symbol. Baker and Vook, however, do teach transmitting and receiving over an antenna array. Paragraph [0004] of Baker teaches a standard MIMO system where the data is split into sub-streams ("*Multi-input Multi-output (MIMO) system...whereby a data stream for transmission is split into a plurality of sub-streams*"). Column 5, lines 20-50 of Vook teach a two antenna scheme where transmission symbols are set with respect to equation (1). Baker and Vook, however, are standard space-time systems wherein the transmitting symbol vectors are calculated and selected ignorant to the power and phase of the received symbol. Thus, Baker and Vook do not suggest the features as recited in claim 1 above.

Applicants' claim 1 is different than the art of record, because of the calculation of a plural set of transmitting symbol vectors and the selection of the transmitting symbol vector for controlling the receiving power and phase of the received symbol ("*a transmitting signal calculation means for calculating plural sets of transmitting symbol vectors ... generating a reference table configured by the plural sets of transmitting symbol vectors, the plural sets of transmitting symbols vectors being for controlling anyone of the receiving power and phase of the radio station ... generating transmitting symbols by selecting one set of the transmitting symbol vector from the reference table*").

Some of the features of amended claim 1 were previously recited in dependent claim 7 and 10 (7 and 10 were not rejected based on prior art). Specifically, amended claim 1 recites *"transmitting symbol calculation means"*, *"symbol mapping means"*, and *"carrier modulation means"* as similarly recited in claim 7. Amended claim 1 also recites *"generating a reference table"* which has been deleted from claim 7. Furthermore, amended claim 1 recites *"the plural sets of transmitting symbol vectors being for controlling any one of receiving power and phase"* which was previously recited in cancelled claim 10.

Applicants' system generates a plurality of sets of symbol vectors and then selects one of these sets of symbol vectors in order to control the power and phase of the receiving symbol. For example, page 31, lines 1-10 of the specification teaches selecting a set of transmission symbols so that the power of the received symbol is above a particular threshold value (*"one for example, selects the set of transmitting symbols ... so that the power of the receiving symbol 410a in the receiving station 202 can be equal or above the particular threshold value"*). The specification also states the selection of a set of transmission symbols so that the received signal power will fall below a particular threshold (*"is zero, the symbol selection means 313 will select a set of transmitting symbols ... so that the power of the receiving symbol 410 can be less than the particular threshold value"*). Furthermore, page 33, lines 17-27 of the specification teaches that these sets of transmitting signals can be generated and selected to control the phase of the received symbol (*"when the received symbol 410a belongs to, for example, the right half on the complex plane, it would be determined as 1"*). An example of the plurality of sets of transmission vectors are illustrated in Figs. 18A, 18B and 19. Specifically, in Fig. 18B, in order to transmit a data bit of 1, the system must select one of the four possible transmission symbol vectors. As stated earlier, this selection is based on controlling the power and phase of the received symbol.

It's because Applicants include the feature of *"a transmitting signal calculation means for calculating plural sets of transmitting symbol vectors ... generating a reference table configured by the plural sets of transmitting symbol vectors, the plural sets of transmitting symbols vectors being for controlling anyone of the receiving power and phase of the radio station ... generating transmitting symbols by selecting one set of the transmitting symbol vector from the reference table"*, that the following

advantages are achieved. An advantage is the ability to control the power and phase of the received symbol so that they fall above or below a predetermined threshold value. Accordingly, for the reasons set forth above, claim 1 is patentable over the art of record.

Independent claims 13, 18, 23, 24 and 27 have been similarly amended to claim 1. Thus, claims 13, 18, 23, 24 and 27 are also patentable over the art of record for the reasons set forth above.

The features of dependent claim 10 are now recited in independent claim 1. Thus, claim 10 has been cancelled.

Dependent claims 2-9, 11, 12, 14-17, 19-22, 25 and 26 include all the features of the claims from which they depend. Thus, claims 2-9, 11, 12, 14-17, 19-22, 25 and 26 are also patentable over the art of record for the reasons set forth above.

In view of the amendments and arguments set forth above, the above-identified application is in condition for allowance which action is respectfully requested.

Respectfully submitted,


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Attachments: Figures 3-5, 7, 9-11, 13, 16-17, 21-22 (12 sheets)

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